



HARNESSING DATA AND TECHNOLOGY TO MAKE SUPPLY CHAINS RESILIENT

Abstract

Since COVID-19, supply chain disruption has become a prevalent topic among manufacturers. post-pandemic, many of them struggled to reorganize their planning and operations to cope with worldwide shutdowns, even as product demand surged. Supply chain resilience is the art of rebalancing operations across internal teams, suppliers, customers, and trading partners to ensure smooth sourcing, production, and order fulfillment. This paper examines the importance of data, emerging technologies, costs, and relevant stakeholders in creating resilient supply chains. It also explains how the right technologies and solutions can support strong transformation approaches for manufacturers eager to achieve supply chain resilience.

Introduction

Supply chain disruptions, brought on by wars, pandemics, and natural calamities, are becoming common. Recovering from such events requires a resilient supply chain that can anticipate upcoming disruptions, pivot and adapt, and leverage smart logistics to fulfill customer orders. Building this level of resilience calls for a fundamental transformation of how supply chains operate, often with significant investment. Hence, it is important for manufacturers to understand the critical areas of supply chain resilience, identify the key stakeholders, and deploy the right-fit solutions.

Data Challenges in Supply Chains

Data plays a crucial role in building resilience within supply chains. Internal data, such as supply network information from suppliers to customers, as well as external data, such as market volatility and unpredictable demand patterns, can significantly impact supply chains. Having such data readily available to feed artificial intelligence (AI) engines can help manufacturers sense, identify, and proactively respond to potential supply chain disruptions. However, most manufacturers struggle with data management challenges such as:

Lack of data standardization and harmonization:

Creating a single source of truth for master data is imperative, yet challenging.

This must include data across suppliers, customers, products, and product structures. Data harmonization should also extend to entities that have been integrated into the organization.



Low data tracking and traceability:

Most manufacturers struggle to take timely action to avoid potential disruptions due to the lack of real-time data visibility across the supply chain network.



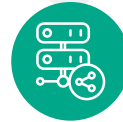
Poor data quality:

Poor quality can lead to inaccuracies in lead-time data and master data, as well as data duplication and incomplete attribution.



Ineffective data sharing:

The lack of secure and seamless data-sharing channels among stakeholders in the supply chain impacts trust among trading partners. It can eventually result in disruptions.



Capabilities and Technologies that Build Supply Chain Resilience

Several capabilities make supply chains resilient to disruptions. Emerging technologies are instrumental in enabling such capabilities, as described below:



Data visibility and traceability:

As noted earlier, real-time data visibility and traceability are crucial for supply chain resilience. Without these capabilities, organizations struggle to identify and respond to problems in the supply chain. Sensors enabled by the Internet of Things (IoT) can monitor the temperature, humidity, and movement of goods across tiers in a large fleet, thereby reducing uncertainty in the supply chain. Further, blockchain solutions can ensure that accurate information is securely collected and shared among relevant stakeholders.



Strong risk management strategies:

Manufacturers must establish clear and precise risk management frameworks to respond effectively to global and local events that may cause supply chain disruptions. To this end, AI, machine learning (ML), and agentic AI can help with early decision making and taking corrective actions to minimize impact. Agentic AI models can simulate threats and autonomously recommend responses. They can also dynamically adjust inventory, reroute logistics, and rebalance supply as well as demand in real time. Advanced predictive analytics are particularly useful in highlighting weak points across supply chain networks.



Operational adaptability and agility:

This includes the adoption of flexible enterprise resource planning (ERP) systems that can respond dynamically to disruptions. For instance, autonomous robotics and precision material-handling equipment enable real-time visibility in warehousing and production operations. Drones can assist in delivering goods to remote or inaccessible locations during disruptive events, such as natural calamities or wars. 3D printing capabilities can deliver product models at scale to avoid any supply disruptions during high-demand scenarios.



Reliable responsiveness:

When disruptions occur, manufacturers should rapidly deploy proven and effective response strategies to protect their supply chains and ensure operational reliability. Advances in planning systems allow manufacturers to pivot quickly and replan the next course of action. However, this requires intensive experimentation with different approaches to find the right response strategy. Digital twins can simulate real-world supply chain conditions to test disruption response approaches before finalizing the appropriate solution. Through smart operations, IoT, and digital twins, manufacturers can sense information in real time, enabling better visibility and timely decision making.

It is important to underscore how recent advances in AI are accelerating supply chain resilience. For several years, manufacturers leveraged AI to transform supply chain operations. More mature AI models today can harness vast amounts of internal and external data to enable early detection and recovery from disasters and disruption. Agentic AI models can detect anomalies and automate responses to avoid disruptive situations, thereby protecting profitability and ensuring reliability.

Resilience Vs. Cost – A Practical Approach

Enabling supply chain resilience calls for comprehensive transformation across people, processes, and technology. When building the business case of outcome versus cost, it helps to analyze key parameters such as:



Service levels:

Manufacturers must consider the level of service they wish to maintain during supply chain disruptions. Higher service levels require holding more inventory, which translates to additional costs.



Supplier relationship management:

Supplier relationships are critical for resilient supply chains while optimizing cost. A strong relationship can significantly mitigate supply risks.



Technological maturity:

Modern ERP and supply chain management (SCM) systems can facilitate data visibility, operational agility, timely responsiveness, and real-time decision making. Modernizing the technology landscape can significantly boost resilience at a manageable cost.

Frequently, policy changes can alter the balance between cost and resilience. For instance, the US government recently imposed tariffs on goods imported from other countries. In the short term, these tariffs could disrupt supply chains as customers bear the cost of such taxes. Manufacturers must also assess whether their ERP systems can adapt to the impact of tariffs on import transactions. However, in the long term, such tariffs may help redistribute supply chains. For example, the semiconductor industry operates within a globally distributed supply chain, from design to delivery of the product, to customers across the world. It is almost impossible to move this supply chain to one region / one country in a relatively short time period so it is critical to ensure that supply chain for semi conductor industry are kept out of the tariffs to ensure semiconductor supply chains continue to be resilient in the future as well.



Key Stakeholders in Supply Chain Resilience

Supply chain resilience develops when key stakeholders are consulted and aligned with the overall goals of the organization. It includes the following enterprise functions:

Procurement:



Strong supplier relationships are crucial for successful deliveries from suppliers. Procurement teams secure alternate sources of supply, thereby mitigating any disruptions or delays when sourcing critical components.

Demand, supply, and production planning:



During disruptive events, planning teams are responsible for maintaining higher inventory levels and finding alternate suppliers. Production planning makes sure that key components are built ahead of time, thereby preventing delays due to long lead time.



Operations:

This team, comprising the internal factory workforce, ensures continuity in production activities. They are responsible for implementing backup plans to deal with labor shortage and other contingency situations.



Human resources:

The role of this department includes implementing policies and hiring temporary labor when managing high-demand situations. They also foster strong relationships with employees as well as build loyalty and resilience within the workforce.



How Infosys Helps Customers Manage Supply Chain Resilience

With deep experience and proven expertise in implementing next-generation solutions, Infosys has been helping manufacturers transform operations for a sharper competitive edge. Some of our key differentiators are:

Implementing holistic supply chain planning solutions that introduce resilience into manufacturing operations, helping users predict supply chain disruptions and take timely corrective action

Leveraging Oracle Planning Cloud to support value-driven supply chain transformation

Creating supply chain analytics solutions that support predictive decision making

Employing advanced technologies like agentic AI, IoT, blockchain, and digital twins to improve supply chain visibility

Conclusion

Supply chain resilience rose in significance during COVID-19 and has since become a top priority for manufacturers. Disruptions caused by geopolitical tensions, new trade regulations, and market volatility can severely impact production operations and profitability unless manufacturers prioritize building resilience into their supply chains. When planning for supply chain resilience, manufacturers must weigh the costs involved vis-à-vis the desired level of resilience. Further, they should focus on how modern technologies and software can help them stay ahead of the curve. Technologies such as AI, agentic AI, digital twins, IoT, and blockchain hold the key to achieving such resilience at the right cost.

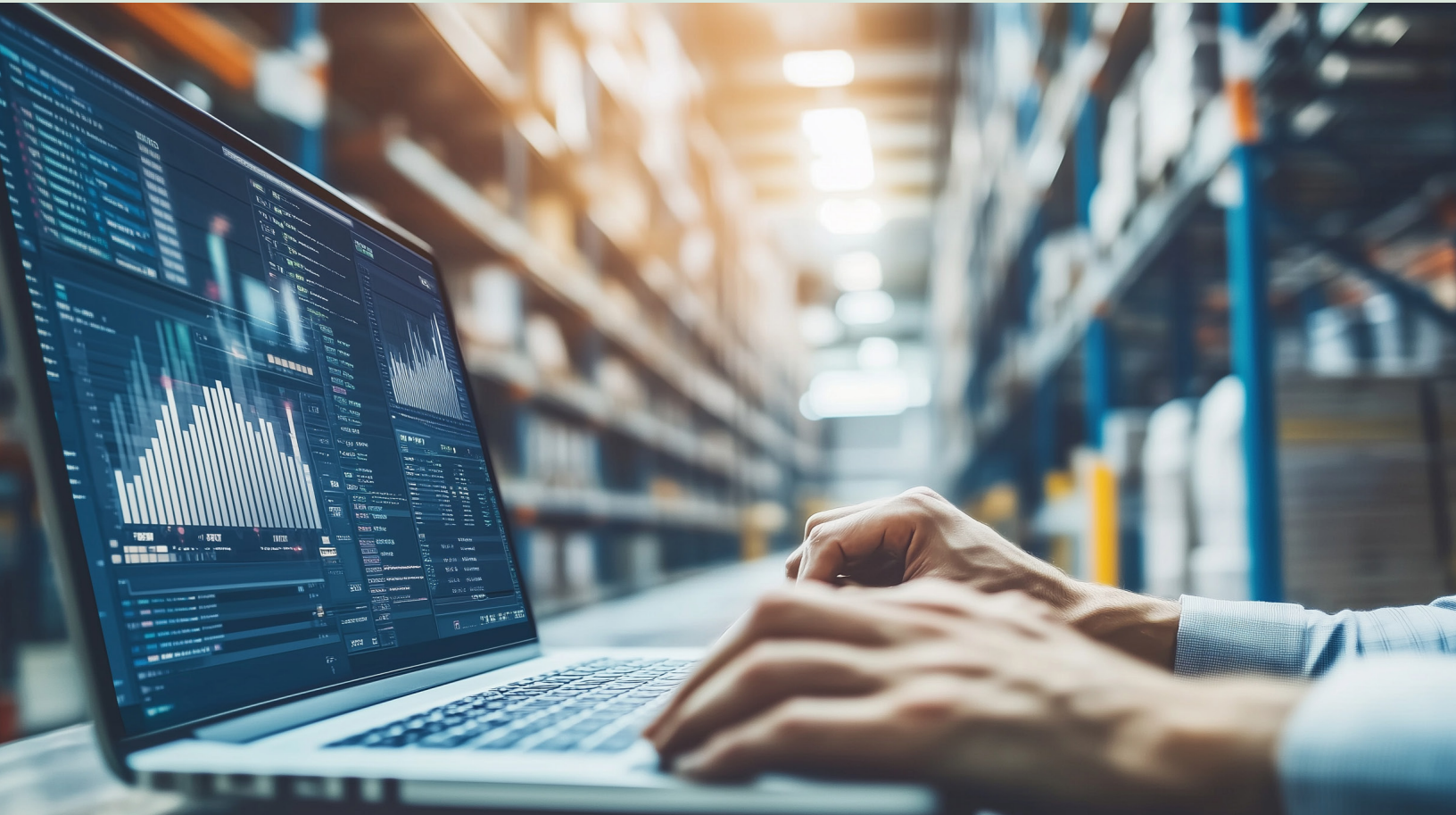
About the Author



Somnath Majumdar

AVP - Senior Industry Principal

Somnath has over 24 years of experience in Supply Chain Management related transformation programs. He has helped global clients with SCM strategy and deployment of supply chain solutions. He has helped clients across multiple industry segments including manufacturing, hi-tech, retail, professional services in their data journey. He is a thought leader in the supply chain management space.



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For more information, contact askus@infosys.com

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